

What is claimed is:

5 1. An exposure apparatus that transfers an image set movably by a stage assembly onto a device utilizing a beam of light, the exposure apparatus being adapted to be mounted to a mounting base, the exposure apparatus comprising:

a base assembly that includes at least a portion of the stage assembly;

10 a base isolation system that secures the base assembly to the mounting base, the base isolation system reducing the effect of vibration of the mounting base causing vibration on the base assembly;

an optical assembly that includes an optical device that directs the beam of light and a stage base of the stage assembly; and

15 an optical isolation system that secures the optical assembly to the base assembly, the optical isolation system reducing the effect of vibration of the base assembly causing vibration on at least one of the optical assembly and the optical device.

2. The exposure apparatus of claim 1 wherein the base isolation system includes a plurality of spaced apart base flexible supports that attenuates movement of the base assembly relative to the mounting base.

20 3. The exposure apparatus of claim 1 wherein the base isolation system includes a plurality of spaced apart base movers that adjusts the position of the base assembly relative to the mounting base.

25 4. The exposure apparatus of claim 1 wherein the optical isolation system includes a plurality of spaced apart assembly flexible supports that attenuates movement of the optical assembly relative to the base assembly.

5. The exposure apparatus of claim 1 wherein the optical isolation system includes a plurality of spaced apart assembly movers that adjusts the position of the optical assembly.

6. The exposure apparatus of claim 1 wherein (i) the base isolation system includes a plurality of spaced apart base flexible supports that attenuates movement of the base assembly relative to the mounting base and a plurality of spaced apart base movers that adjusts the position of the base assembly relative to the mounting base and (ii) the optical isolation system includes a plurality of spaced apart assembly flexible supports that attenuates movement of the optical assembly relative to the base assembly and a plurality of spaced apart assembly movers that adjusts the position of the optical assembly relative to the base assembly.

7. The exposure apparatus of claim 1 wherein the base assembly includes a base frame that supports a portion of the stage assembly.

8. The exposure apparatus of claim 7 wherein the base assembly also includes a portion of a second stage assembly that is at least partly supported by the base frame.

9. The exposure/apparatus of claim 8 wherein the base assembly further comprises a first enclosure that substantially encircles the stage assembly.

10. The exposure apparatus of claim 9 wherein the base assembly further comprises a second enclosure that substantially encircles the second stage assembly.

11. The exposure apparatus of claim 7 wherein the base frame defines a frame aperture and wherein a portion of the optical assembly extends into the frame aperture.

12. The exposure apparatus of claim 11 wherein the optical assembly includes an optical frame that fits within the frame aperture of the base frame, the optical frame being secured to the optical device.

13. The exposure apparatus of claim 1 further comprising a support frame that extends between the mounting base and the base isolation system to support the base assembly away from the mounting base.
14. The exposure apparatus of claim 13 wherein the optical isolation
5 system includes an assembly mover that adjusts the position of the optical assembly relative to the base assembly, the assembly mover including a first component that is secured to the support frame and a second component that is secured to the optical assembly.
15. The exposure apparatus of claim 13 including a base position
10 sensor that monitors the position of the base assembly relative to the support frame.
16. The exposure apparatus of 13 including a base acceleration sensor for measuring the absolute acceleration of the base assembly.
17. The exposure apparatus of claim 1 wherein the optical assembly
15 includes an optical frame that is secured to the optical device.
18. The exposure apparatus of claim 17 wherein at least a portion of a measurement system is secured to the optical assembly.
19. The exposure apparatus of claim 1 wherein the stage base is secured to the optical assembly.
20. A device manufactured with the exposure apparatus according to
20 claim 1.
21. A wafer on which an image has been formed by the exposure apparatus of claim 1.

22. The exposure apparatus of claim 1 wherein the base isolation system and the optical isolation system are at approximately the same height along the Z axis.

23. A method for making an exposure apparatus that transfers an image set movably by a stage assembly onto a device utilizing a beam of light, the exposure apparatus being adapted to be mounted to a mounting base, the method comprising the steps of:

providing a base assembly that includes at least a portion of the stage assembly;

providing a base isolation system;

securing the base assembly to the mounting base with the base isolation system, the base isolation system reducing the effect of vibration of the mounting base causing vibration on the base assembly;

providing an optical assembly that includes an optical device that directs the beam of light and a stage base of the stage assembly;

providing an optical isolation system; and

securing the optical assembly to the base assembly with the optical isolation system, the optical isolation system reducing the effect of vibration of the base assembly causing vibration on at least one of the optical assembly and the optical device.

24. The method of claim 23 wherein the step of providing a base isolation system includes providing a plurality of spaced apart base flexible supports for attenuating movement of the base assembly relative to the mounting base.

25. The method of claim 23 wherein the step of providing a base isolation system includes providing a plurality of spaced apart base movers for adjusting the position of the base assembly relative to the mounting base.

26. The method of claim 23 wherein the step of providing an optical isolation system includes providing a plurality of spaced apart assembly flexible supports for attenuating movement of the optical assembly relative to the base assembly.

5 27. The method of claim 23 wherein the step of providing an optical isolation system includes providing a plurality of spaced apart assembly movers for adjusting the position of the optical assembly relative to the base assembly.

10 28. The method of claim 23 wherein (i) the step of providing a base isolation system includes providing a plurality of spaced apart base flexible supports for attenuating movement of the base assembly relative to the mounting base and a plurality of spaced apart base movers for adjusting the position of the base assembly relative to the mounting base and (ii) the step of providing an optical isolation system includes providing a plurality of spaced apart assembly flexible supports for attenuating movement of the optical assembly relative to the base assembly and a plurality of spaced apart assembly movers for adjusting the position of the optical assembly relative to the base assembly.

15 29. The method of claim 23 wherein the step of providing a base assembly includes providing a base frame that supports a portion of the stage assembly.

20 30. The method of claim 29 wherein the step of providing a base assembly includes providing a portion of a second stage assembly that is at least partly supported by the base frame.

25 31. The method of claim 30 wherein the step of providing a base assembly includes providing a first enclosure that substantially encircles the stage assembly.

32. The method of claim 31 wherein the step of providing a base assembly further includes providing a second enclosure that substantially encircles the second stage assembly.

5 33. The method of claim 29 wherein the step of providing a base frame includes providing a base frame having a frame aperture and wherein a portion of the optical assembly extends into the frame aperture.

34. The method of claim 33 wherein the step of providing an optical assembly includes providing an optical frame that fits with the frame aperture of the base frame, the optical frame being secured to the optical device.

10 35. The method of claim 23 further comprising the step of providing a support frame that extends between the mounting base and the base isolation system to support the base assembly above the mounting base.

15 36. The method of claim 35 wherein the step of providing an optical isolation system includes providing an assembly mover for adjusting the position of the optical assembly relative to the base assembly, the assembly mover including a first component that is secured to the support frame and a second component that is secured to the optical assembly.

20 37. The method of claim 35 including the step of providing a base position sensor for monitoring the position of the base assembly relative to the support frame.

38. The method of claim 35 including a base acceleration sensor for measuring the absolute acceleration of the base assembly.

25 39. The method of claim 24 wherein the step of providing an optical assembly includes providing an optical frame that is secured to the optical device.

40. The method of claim 39 including the step of providing a measurement system that is at least partly secured to the optical assembly.

41. The method of claim 23 including the step of securing the stage base of the stage assembly to the optical assembly.

5 42. The method of claim 23 wherein (i) the step of providing a base isolation system includes providing a plurality of spaced apart base flexible supports for attenuating movement of the base assembly relative to the mounting base and adjusting the position of the base assembly relative to the mounting base and (ii) the step of providing an optical isolation system includes
10 providing a plurality of spaced apart assembly flexible supports for attenuating movement of the optical assembly relative to the base assembly and adjusting the position of the optical assembly relative to the base assembly.

43. A method of making a wafer utilizing the exposure apparatus made by the method of claim 23.

15 44. A method of making a device including at least an exposure process, wherein the exposure process utilizes the exposure apparatus made by the method of claim 23.

47 ~~58~~ The exposure apparatus of claim ~~58~~ wherein the base isolation system and the optical isolation system are at approximately the same height along a Z axis.

48 ~~60~~ The exposure apparatus of claim ~~57~~ wherein the optical frame
5 includes a first upper base mount that supports a stage base, wherein a proximal section of the first upper base mount and the first support are substantially aligned along the first Z axis.

49 ~~61~~ The exposure apparatus of claim ~~57~~ wherein the optical isolation system includes a first assembly mover that adjusts the position of the optical
10 assembly relative to the base assembly, the first assembly mover being substantially positioned along the first Z axis.

50 ~~62~~ The exposure apparatus of claim ~~57~~ wherein the sensor column includes a second sensor mount that secures the sensor column to the optical frame, and the optical isolation system includes a second support, wherein the
15 second sensor mount and the second support are positioned substantially along a second Z axis.

51 ~~63~~ The exposure apparatus of claim ~~62~~ wherein the sensor column includes a third sensor mount that secures the sensor column to the optical frame and the optical isolation system includes a third support, wherein the third
20 sensor mount and the third support being substantially positioned along a third Z axis.

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48. The exposure apparatus of claim 45 wherein the optical frame includes a second upper base mount that supports the stage base, wherein the optical isolation system includes a second support that is secured to the center frame, and wherein a proximal section of the second upper base mount and the second support are substantially aligned along a second Z axis.

49. The exposure apparatus of claim 48 wherein the optical frame includes a third upper base mount that supports the stage base, wherein the optical isolation system includes a third support that is secured to the center frame, and wherein a proximal section of the third upper base mount and the third support are substantially aligned along a third Z axis.

50. The exposure apparatus of claim 45 wherein the optical isolation system includes a first assembly mover that adjusts the position of the optical assembly relative to the base assembly, the first assembly mover being substantially positioned along the first Z axis.

51. The exposure apparatus of claim 45 wherein the optical assembly further comprises a sensor column, the sensor column including a first sensor mount that secures the sensor column to the optical frame the first sensor mount being substantially positioned along the first Z axis.

52. The exposure apparatus of claim 51 wherein the sensor column includes a second sensor mount that secures the sensor column to the optical frame, and the optical isolation system includes a second support, wherein the second sensor mount and the second support are positioned substantially along a second Z axis.

53. The exposure apparatus of claim 52 wherein the sensor column includes a third sensor mount that secures the sensor column to the optical frame and the optical isolation system includes a third support, wherein the third sensor mount and the third support being substantially positioned along a third Z axis.